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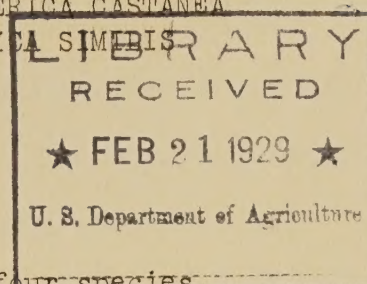
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HOW TO RECOGNIZE WITH A HAND LENS THE GRUBS OF POPILLIA JAPONICA
NEWMAN, ANOMALA ORIENTALIS WATERHOUSE, ASERICA CASTANEA
ARROW, SERICA BRUNNEA LINNAEUS (AND SERICA SIBIRICA)
1ST AND 2ND STAGES).

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Main characters in common for all of the four species.

Dorsally the first six abdominal segments are divided, each into three setose bulges.

None of the legs is either reduced, or has an abnormally small number of joints (fig. 14).

The underside of the labrum has along its free margin a series of numerous transverse small ridges (Tr, figs. 5,6,7), distally a small plate with three or four toothlike spines (Ds, figs. 5,6,7), and centrally a bare area (Ps, figs. 5,6,7) surrounded by setae.

The distal cutting part (dp, figs. 1 and 3) of each mandible terminates with an oblique front edge, which edge anteriorly is prolonged into a long tooth (at, figs. 1 and 3) and posteriorly limited by a short tooth (pt, figs. 1 and 3); the rest of the distal part of the mandible is smooth and entirely without teeth.

Key showing the main characters by which the four species can be separated.

1. Anal opening a slightly curved transverse slit (O, figs. 8 and 9).

Raster (R, figs. 8 and 9) with two longitudinal (parallel or convergent) rows of spines. No ocelli present. Spiracular breathing plate forming an almost complete ring (SpPl, fig. 2). Length of mature larva about 3-1/2 centimeters 2

Anal opening Y-shaped (O, fig. 10). Raster (R, fig. 10) with a single transverse curved row of spines. With a single ocellus on each side of head, each appearing as a tiny black dot behind the antennal insertion. Spiracular breathing plate arcuate (SpPl, fig. 4), not at all approaching a ring in shape. Length of mature larva less than 3 centimeters (usually about 26 mm.)

. 3

2. Raster (R, fig. 8). with the two longitudinal rows of spines long and almost parallel, each row consisting of a dozen or more small, straight spines. Under side of labrum¹ with both very short and long setae surrounding central bare area (Ps, fig. 5)

. Anomala orientalis

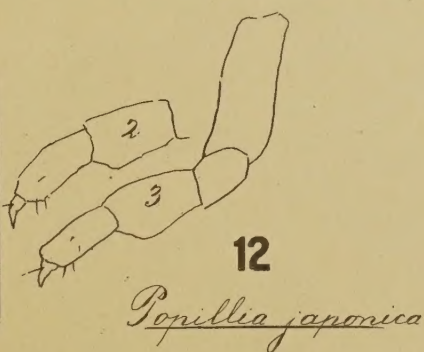
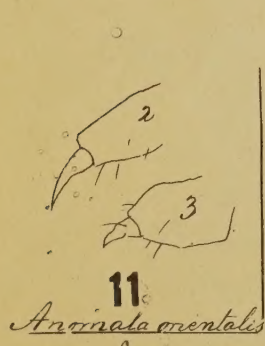
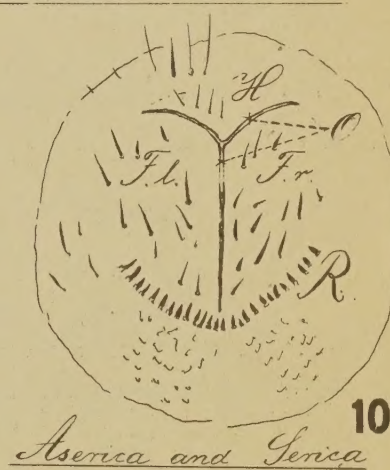
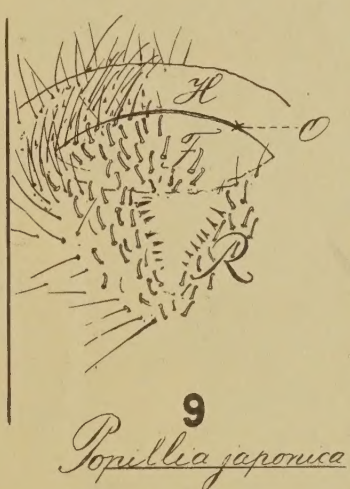
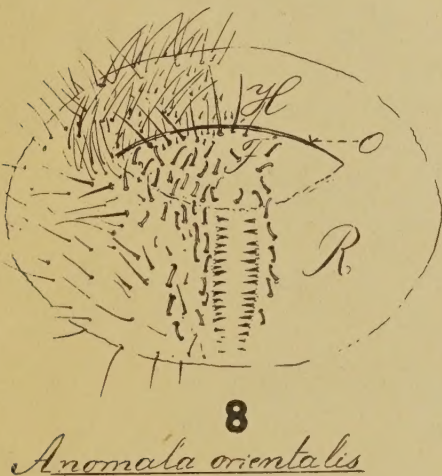
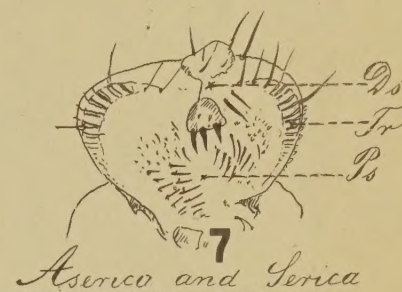
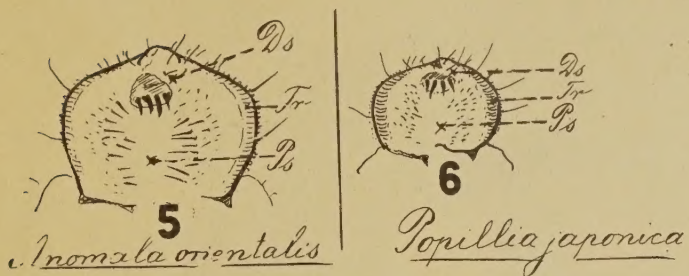
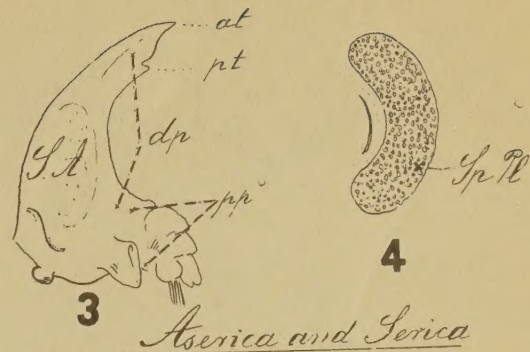
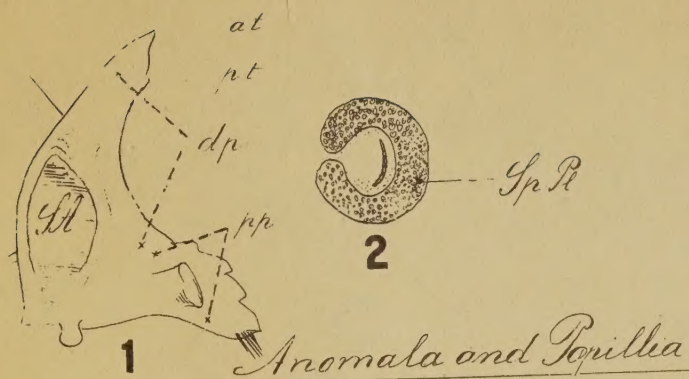
Raster (R, fig. 9) with the longitudinal rows of spines short and converging and each with about seven small, straight spines. Under side of labrum with nothing but short setae surrounding central bare area (Ps, fig. 6) Popillia japonica

3. Ovate tibia of hind leg with claw small and inconspicuous, much shorter than the largest of the setae which surround and hide it (ti and c, fig. 13) Aserica castanea

Ovate tibia of hind leg (3, fig. 14) with claw relatively large and conspicuous (c, fig. 15), about as long as the largest of the setae which surround but do not hide it (ti and c, fig. 15). Serica brunnea (and Serica similis, 1st and 2nd stages).

¹

The labrum is almost symmetrical in the larva of Anomala orientalis but distinctly asymmetrical in the larvae of the other species of Anomala whose larvae are known.



EXPLANATION OF FIGURES

Fig. 1.-Ventral view of right mandible, showing characteristic structures for *Anomala* and *Popillia*; Fig. 2.-Type of spiracular breathing plate characteristic of *Anomala* and *Popillia*; Fig. 3.-Ventral view of right mandible, showing characteristic structures for *Aserica* and *Serica*; Fig. 4.-Type of spiracular breathing plate characteristic of *Aserica* and *Serica*; Fig. 5.-Underside of labrum of *Anomala orientalis*; Fig. 6.-Underside of labrum of *Popillia japonica*; Fig. 7.-Underside of labrum, showing structures characteristic for *Aserica* and *Serica*; Fig. 8.-End view of apex of abdomen of *Anomala orientalis*; Fig. 9.-End view of apex of abdomen of *Popillia japonica*; Fig. 10.-End view of apex of abdomen, showing structures characteristic for *Aserica* and *Serica*; Fig. 11.-Apices of mid (2) and hind (3) legs of *Anomala orientalis*, showing difference in claws; Fig. 12.-Apices of mid (2) and hind (3) legs of *Popillia japonica*, showing similarity of claws; Fig. 13.-Apex of hind leg of *Aserica castanea*, showing short, inconspicuous claw; Fig. 14.-Fore (1), mid (2) and hind (3) legs of *Serica brunnea*; Fig. 15.-Apex of hind leg of *Serica brunnea*, showing long, conspicuous claw.

Drawn by Edward Pooley, 24-X-28.

